

## **Children's Environmental Health: More Than Smoke and Mold**

**Satellite Conference and Live Webcast  
Thursday, June 13, 2019  
12:00 – 1:00 p.m. Central Time**

Produced by the Alabama Department of Public Health  
Video Communications and Distance Learning Division

## **Faculty**

**Anne Turner-Henson, PhD, RN, FAAN  
Retired Professor  
University of Alabama at Birmingham  
School of Nursing**

The World Health Organization (WHO) estimates that more than 1 in 4 child deaths could be prevented by cleaning up the environment. Because of their developing bodies and minds, children can be at greater risk of harm to environmental toxicants than adults. This broadcast will provide information on common sources of environmental hazards in the air, water, and even in our homes and schools. Viewers will learn how to offer evidence-based, practical advice to families, schools, and communities to promote a healthy environment.

## **Objectives**

- Describe the unique vulnerabilities of early life to environmental exposures and threats and how these can predispose the child to later life disease
- Describe the top environmental health issues relevant to children, and children and families at greatest risk
- Identify actionable environmental health messages to use in clinical practice

## **Objectives**

- Identify resources to support healthy environments where clinicians provide care for children and families
- Identify resources to support healthy environments where children live, learn, and play

### **Barker's Hypothesis: Early Life Origins of Health & Disease**

- Prematurity
- Asthma
- Food allergy
- Obesity
- Adult diseases
  - Cardiovascular diseases
  - Diabetes
  - Hypertension
  - Metabolic syndrome
  - Osteoporosis
  - COPD
- Aging

### Children's Unique Vulnerabilities

- Epigenome
  - Impaired DNA methylation
- Preconception
  - Oocyte
  - Sperm
  - Maternal bone accumulations
- Fetus
  - Organ development (weeks 3-8 gestation)
  - Neurodevelopment
  - Placental barrier



### Children's Unique Vulnerabilities

- Newborn
  - Breastmilk
  - Water used for formula
  - Dermal
  - Organ development
  - Body fat
  - Metabolism



### Children's Unique Vulnerabilities

- Infants & Toddlers
  - Oral exploration
  - Introduction of solid foods
  - Higher respiratory & metabolic rates, increased oxygen consumption
  - Exploration – crawling
- Preschool & School-aged
  - Require more calories for growth
  - Spend more time away from home



### Children's Unique Vulnerabilities

- Adolescents
  - Freedom from parental supervision
  - Puberty
  - Reproductive system
  - Risk taking behaviors
  - Occupational exposures



### High-Risk Populations

- Children with special health-care needs
- Poverty
- Predominantly ethnic minorities
- Parents are farm or migrant workers
- Living with parents who have a mental health condition or are substance abusers



### Indoor Air

- Indoor air toxicants – chemicals (household products, pesticides), personal use products (perfumes, cosmetics), gases (formaldehyde), allergens (dust mites, rodents, cockroach), smoke (wood stoves, tobacco), electronics (computers, TV's), lead, mold, etc.
- Toxicant levels indoors may be 2-5 times higher than outdoor levels

## Indoor Air

- 80-90% of child's time spent indoors
- Breathing zones for young children are lower to the floor where many chemicals may be concentrated
- Exposures associated with respiratory symptoms, asthma exacerbations

## Tobacco

- Tobacco
  - Cigarette
  - Electronic cigarettes
- Smoking rates US (CDC, 2017): 14% adults
  - 15.8 % men, 12.2% women
  - 10.4% young adults (ages 18-24 yrs.)
  - Minorities
  - Low education
  - Low income



## Tobacco

- Secondhand/Thirdhand smoke exposure
  - Ear infections
  - More frequent and severe asthma exacerbations
  - Respiratory symptoms
  - Respiratory infections
  - Greater risk for SIDS



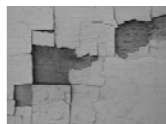
## Lead

- No lead level considered safe
- Major sources
  - Lead based paint (homes built pre-1978)
  - Dust
  - Water (older fixtures, lead solder connecting pipes)
  - Food or Lead-Glazed Pottery
  - Alternative or complementary medicines, herbs, or therapies
  - Cosmetics
  - Toys (older, imported)
  - Occupations or hobbies



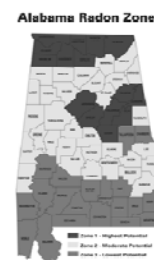
## Lead

- Pregnancy
- Brain development
- Hand to mouth behaviors
- Adolescents
- Special populations: Immigrants, foreign-born adoptees, refugees, children who live with parents whose parents work lead in their occupation or hobbies



## Radon

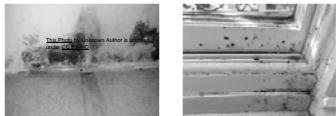
- Enters homes through cracks or openings in walls, foundations and floors
- Second most common cause of lung cancer in the US



<http://www.alabamapublichealth.gov/radon/radon-in-alabama.html>

## Mold and moisture

- Water leaks leading to mold overgrowth
- Heavy precipitation, floods, tornadoes, hurricanes
- Rental homes
- Mold common asthma trigger
- Respiratory symptoms such as allergic rhinitis and irritation of eyes, nose and throat



- CLEAN-UP

## Pesticides

- Chemicals used to control insect, weed, mold & rodent problems
- Home use
- Parental/adolescent occupational exposures (agricultural, industry)
- Pesticides removed from market often linger longer in the physical environment



## Pesticides

- Children's risks – higher metabolism rates, developing immune systems, hand to mouth behaviors, diets, time spent outdoors
- Exposures linked to developmental, cognitive and behavioral adverse outcomes
- Micro, accumulative exposures – risks unknown



## Household Chemicals

- Cleaning products, plastics/vinyl products, personal care products, new furniture (wood), solvents
- Phthalates, BPA, formaldehyde, VOC's (volatile organic compounds), POP's (persistent organic compounds)



## Household Chemicals

- Allergic reactions, migraines, nausea, respiratory symptoms, asthma exacerbations
- Long term effects are often unknown

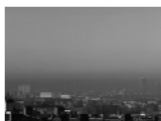


## Outdoor air

- Particulate Matter (PM)
  - PM<sub>10</sub> - Can enter and be deposited in the respiratory system
  - PM<sub>2.5</sub> - Can enter and be deposited in the pulmonary system where it can affect both the respiratory and cardiovascular systems
- Ozone - ground-level ozone (O<sub>3</sub>), and produced in troposphere

### Outdoor air

- Post neonatal mortality & long-term
- Asthma exacerbations and respiratory symptoms
- Children's lung growth and function



### Climate Change

- Major physical, chemical, and ecological changes
- Changes in temperature, precipitation patterns, sea level, and extreme weather events



### Climate Change

- Impact on children:
  - Increased heat stress
  - Decreased air quality
  - Altered disease patterns of some climate sensitive infections
  - Physical/mental effects from extreme weather events
  - Food insecurity

### Actionable Messages

- Frame messages positively
- Craft messages in lay language
- Delivery methods
- Work together with community and public health partners



### Priority Environmental Health History

- Does anyone in the home use tobacco or electronic cigarettes?
- Is there peeling paint in the home?
- What type of heating/air system does your home have? (Radiator, Forced Air, Gas Stove, Wood Stove, etc.)
- What is your drinking water source: well water? tap water? Bottled water?

### Priority Environmental Health History

- Is there water damage or mold present in the home?
- Are chemicals or pesticides used or stored either inside or outside the home?

Adapted from NEEF: [www.neefusa.org/resource/pediatric-environmental-history](http://www.neefusa.org/resource/pediatric-environmental-history)

### Priority Environmental Health History

- Is your child protected from too much sun?
- Do you (adolescent) visit a tanning salon?
- Does your child eat fish? What kind and how often?
- Has your home been tested for radon?
- Is your child protected from excessive noise?
- What are the occupations of all adults/adolescents in the household?

Adapted from NEEF: [www.neefusa.org/resource/pediatric-environmental-history](http://www.neefusa.org/resource/pediatric-environmental-history)

### Actionable Key Messages

- Indoor air quality
  - Ventilation of home
  - Change central heating & air conditioning filters, as well as exhaust units
  - Indoor humidity 30-50%
  - Reduce use of products that release air pollutants

### Actionable Key Messages

- Tobacco smoke exposure
  - Inquire at every visit about smoking (home/car)
  - Offer smoking cessation counseling & resources (Quit Line)
  - No smoking rules in homes & cars

**1.800.QUITNOW**  
 QUITNOW.ALABAMA.COM  
 1-800-784-1469

### Actionable Key Messages

- Radon
  - Know the risks in your community
  - Home radon testing (school buildings should be tested too)
  - New home construction

### Actionable Key Messages

- Lead
  - Lead screening
  - Baby formula preparation if concerned about lead in tap water
  - Wash hands and remove shoes before entering the home
  - Wet mopping and dusting to reduce lead exposure

### Actionable Key Messages

- Contact public health department if peeling paint is present
- Home remediation in older homes
  - risks for pregnant women & young children (< 6 years)

## Actionable Key Messages

- **Mold & Moisture**
  - Repair water leaks
  - Clean gutters & drain water away from home foundations
  - Extensive mold (> 10 square feet) requires certified contractor



## Actionable Key Messages

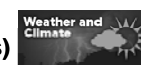
- **Pesticides**
  - Avoid use if possible (homes), otherwise use baits/traps/gels
  - Wash fruits & vegetables
  - Storage and disposal
  - Integrated pest management (homes, schools)

## Actionable Key Messages

- **Household chemicals**
  - Read labels carefully (NEVER remove labels)
  - Keep in the original containers
  - Do NOT MIX products
  - Use less toxic cleaning products (vinegar/water)
  - Store out of reach (children/pets)
  - National Poison Control

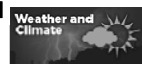
## Actionable Key Messages

- **Outdoor air quality**
  - Monitor outdoor air quality – [airnow.gov](http://airnow.gov)
  - Special precautions for action days (homes, schools)
  - Cleaner commute
  - Car maintenance – keep tires properly inflated, avoid engines that smoke



## Actionable Key Messages

- Conserve electricity
- Use environmentally safe paints & cleaning products
- Use gas logs instead of wood
- **Climate change**
  - Reduce energy use
  - Prepare for weather disasters



## Healthy Clinical Practice Environment

- “Chemical soup”
- Hazards in general maybe neurotoxins, teratogens, reproductive, carcinogens, musculoskeletal, psychological stressors, respiratory irritants



### **Healthy Clinical Practice Environment**

- **Green Cleaning – using products that pose the least risk to human health**
- **Using alternative products (non-mercury, safer plastics, etc.)**
- **Healthcare Associated Infections (HAI's) – safer disinfectants**

### **Healthy Clinical Practice Environment**

- **Waste Minimization**
  - **Segregation**
  - **Source reduction**
  - **Resource recovery & recycling**